Executive Summary – RRS ST XP Test report

The Radiosonde Replacement System (RRS) System Test on the Gateway 6300 personal computer running the Windows XP operating system (ST XP) commenced on April 14, 2005 and successfully concluded on Friday, April 29, 2005. This two week test was conducted using both simulated and live upper air radiosonde flights to validate replacing the current RRS Workstation Subsystem (RWS) using the Windows 2000 operating system with a personal computer running the Windows XP operating system (ST XP).

There were three objectives of the ST XP Test:

a. Assess the impact of changing the RWS computer and operating system by re-validating the RWS System Requirement Specification (SRS);

b. Verify the RWS installation instructions contained in Engineering Handbook (EHB) 9-904 were accurate and complete; and

c. Determine the stability of the RWS software for deployment to operational sites.

Briefly, the test objectives were tested as follows:

a. OPS24 conducted a series of 83 test procedures (due to time constraints) to validate 339 out of 398 RWS SRS requirements; products from both simulated and live flights were examined by OPS22 and OS7 for possible operating system impacts; real products from live flights were analyzed by OPS22, OS7, the National Centers for Environmental Prediction (NCEP) and the National Climatic Data Center (NCDC);

b. The RRS Software Installation (Version 0.0.0.214) was performed by the OPS24 System Test (ST) test team at the WSH and the Sterling Research and Development Center (SR&DC). The EHB9-904, Sections 1.2.2, 1.2.2.1, 1.2.2.2, 1.2.2.3, and 1.2.2.4 were used for this installation. Changes to the document were recommended to OPS12 for EHB 9-904 in the area of establishing communication security keys to the AWIPS; and

c. Forty-three new SIRs were observed against the RWS software build tested—of which 6 SIRs were classified as Impact 1 – prevents successful observation. However, after RWS Configuration Control Board (CCB) adjudication; 34 SIRs remained open—of which 3 were Impact 1.

At the May 5, 2005, RRS Test Review Group wrap-up meeting, OPS24 commented it was risky to proceed to the ST II at Caribou with known Impact 1 and 2 SIRs. However the RRS Program Manager, decided to proceed. The rationale being the operational upper air system would perform in parallel to the test system and therefore, there would be no risk to the normal upper air operations. The benefits of testing the RRS in another operational environment using field personnel outweigh the risks.

System Test (ST) Report for the Radiosonde Replacement System (RRS) Workstation Subsystem (RWS) Using the Windows XP Operating System

1.0 Introduction

The National Weather Service (NWS) will transition from the current radiosonde system to the Radiosonde Replacement System (RRS) to collect and process upper air data using modern technology. The RRS will be nationally deployed after the government successfully completes a series of tests, the last two of which will be the System Test (ST) and the Operational Acceptance Test (OAT).

Three previous developmental tests (designated as ST Phase 0, ST Phase 0.1, and ST Phase 0.2) were conducted as "dry runs" for the formal ST. These tests document system problems as System Issue Reports (SIRs) for resolution to optimize a successful, formal ST.

The Office of Operational Systems, Field Systems Operations Center, Test and Evaluation Branch (OPS24) conducted (using the System Test Plan for the RRS dated July, 2003) the first phase for ST, Phase IA, for the RRS with analytical support from OPS11, OPS22, OS7, the National Centers for Environmental Prediction (NCEP), and the National Climatic Data Center (NCDC). The ST Phase IA began on May 24, 2004 and ended on July 2, 2004, as planned. Two test sites were used: 1) National Weather Service Headquarters (WSH) in Silver Spring, MD; and the Sterling Research and Development Center (SR&DC) in Sterling, VA.

Due to the number of deficiencies found in the RRS during Phase IA, management decided to have a ST for conducting a subset of benchmark and live flight wrap-up tests on an updated version of the RRS. The updated RRS consisted of redesigned Sippican radiosondes, a new version of the Signal Processing Subsystem (SPS) firmware, and an enhanced version of the RRS Workstation Subsystem (RWS) application software. The ST XP began on February 14 and ended on March 4, 2005. (A Readiness Review was conducted on February 9.)

When the NWS prepared to purchase the production RWS computers for field deployment, it was discovered computer vendors no longer supported the Windows 2000 operating system on new computers. This necessitated a migration to the Windows XP operating system. The RRS Program Manager approved changing to the new operating system as well as replacing the current RWS Gateway E-6000 computer with the Gateway 6300 personal computer. This series of tests was designated as the ST XP. This report documents the test results and recommendations of the ST XP.

2.0 Objectives

The objectives for the ST XP were as follows:

1. Assess the impact of changing the RWS computer and operating system by re-validating the RWS SRS;

2. Verify the RWS installation instructions contained in Engineering Handbook (EHB) 9-904 were accurate and complete; and

3. Determine the stability of the RWS software for deployment to operational sites.

All abnormalities (software, hardware, or documentation) observed during test conduct, were documented by SIRs and were provided to the RRS Configuration Control Board (CCB) for adjudication.

3.0 Constraints/Assumptions

The RRS Program Manager directed OPS24 to begin the ST XP with the constraint of known problems in the Signal Processing Subsystem (SPS) firmware version 2.10 affecting accuracy of wind information, GPS capability, and Quality Indicator (QI) values.

Initially, there was a concern there would not be a sufficient number of the Sippican Mk II revision K radiosondes available during the test. However, three cases of radiosondes arrived prior to the start of live flight testing.

4.0 Test Conduct

This section of the report describes the ST XP test configuration, day–by-day test conduct, a summary of all upper air flights flown, and a listing of all SIRs observed.

4.1 ST XP Readiness Review Meeting

The ST XP Test began on April 14, 2005, with a Readiness at which the following was discussed:

a. RWS Software (OPS23, Eddie Roberts)

(1) Benchmark Test Status – All core and previously failed benchmark tests have been completed and have passed. There were some issues, but they were resolved. Two potential problems could occur: (1) Exiting a flight normally with the computer's power saver option turned on may redirect you to Rework rather than exiting RWS. (2) McAfee may generate an error when RWS shuts down. Also, the Hyper-Thread technology option needs to be turned off. OPS23 provided OPS24 with direction for turning the

Hyper-Thread option off. Other cautions included: (3) If the Offline Maintenance Suite (OMS) is loaded before RWS, you may "lose" the LDAD directory.

(2) Impact 1 and 2 SIR Status – All pertinent SIRs, which had not been deferred by the RRS Configuration Control Board (RRS CCB), were implemented and documented in the Version Description Document (VDD) provided to OPS24 and dated April 14, 2005 (and as modified on April 25, 2005).

(3) RWS build – RWS build delivered was 214

(4) OMS build 1.5a was delivered and is described in the respective VDD dated April 14, 2005 and modified on April 25, 2005.

b. J-700 System (OPS11, John Monte; OPS22, Jim Fitzgibbon)

(1) Status of Systems at the SR&DC in Sterling, VA – John Monte reported he recertified RRS System 7 prior to the Review. He had sent an e-mail to OPS24 when the recertification was completed. (however, OPS24 did not request re-certification of System 6 RRS. Refer to Section 4.2 Test Configuration.)

(2) Status of Support at SR&DC – Due to losing two people from his staff, Jim Fitzgibbon indicated he could provide one person for test support. Nick Schmid was the primary OPS22 support provider with assistance from Paul Rockwood.

c. SPS (OPS11, Ivan Navarro)

(1) SPS firmware version – The current version is 2.10.

(2) Known Problems - Sippican is working on changes to the firmware to incorporate presenting missing wind data as all 9's rather than as 0's; resolved GPS issues; and meaningful Quality Indicator (QI) values for WVO data. Ivan indicted there should be minimal impact on OPS24's live flight testing. The subject matter experts present agreed products sent to the NCEP would not be affected as the NCEP was more interested in the thermodynamic data (especially, RH) rather than wind data. Ivan could not provide a date when the firmware update would be available.

Following the Readiness Review, two WSH Gateway 6300 computers (designated "Yellow" and "Blue") assigned to OPS24 were "ghosted" and had RWS application software build 214 loaded. The same procedure was performed on RRS Systems 6 and 7 at the SR&DC on April 15, 2005. In addition, the RRS Offline Maintenance Suite (OMS) application was loaded on RRS Systems 6 and 7.

4.2 Test Configuration/Installation

OPS11 certified the SR&DC System 7 as being operationally ready to commence testing and provided the re-certification information contained in Attachment 1. (Note: It was necessary to deviate from the ST XP strategy dated March 17, 2005.

Originally, OPS24 specified in the ST XP Test Strategy, both RRS systems at the SR&DC would be certified with System 7 using the Windows XP operating system and System 6 using the original Windows 2000 operating system for comparison purposes. However, once OPS23 began work on the operating system migration, there was no further updates to the Windows 2000 RWS software—yet, there were numerous changes made to the software. It would have been necessary for System 6 to use RWS software build 198 while System 7 would have software build 214. As it would not be possible to use System 6 as a control, a decision was made by the ST Director to load Windows XP on both systems in order to obtain additional test data points even though System 6 had not been re-certified by OPS11.)

OPS24 commenced the ST XP Test at WSH on April 14, 2005, with RWS software build 214 using Systems Yellow and Blue. The RWS software was installed by OPS24 personnel with assistance from OPS23.

On April 15, 2005, OPS24 performed a "ghosting" operation on both SR&DC System 6 and 7. The installation procedures contained in EHB 9-904 were followed and "redlined." The recommended changes to EHB 9-901 mostly dealt with the area of establishing communication path security keys with the AWIPS Local Data Acquisition Devise (LDAD). The comments were provided by SIR to OPS12 for inclusion.

4.2 Daily Test Events

A day-by-day account of the ST XP test follows: (Note: These are excerpts from the daily status reports)

April 14: The RRS Software Installation (Version 0.0.0.214) was performed by the OPS24 System Test (ST) test team at the WSH. The EHB 9-904, Sections 1.2.2, 1.2.2.1, 1.2.2.2, 1.2.2.3, and 1.2.2.4 were used for this installation. The total time for the ST test team to complete the software installation was 2.5 hrs. However, the actual time for the software installation at field sites may be longer because some of the installation steps were not applicable for the WSH RWS.

Eddie Roberts (OPS23) assisted the OPS24 with the installation of data sets (mal files) on the External Data Pump (XDP). These mal files are required to run simulated flights during the ST. OPS23 also provided OPS24 with the procedures to verify and disable the Hyper-Thread technology in the BIOS setup.

Two sets of RWS Installation Software CDs were provided by OPS23. The ST XP test began with OPS24 performing a "ghosting" operation on two RWS workstations with

WMO numbers 69003 (“Yellow” system), and 69004 (“Blue” system) respectively and then installing the RWS application software build 214.

The RWS Software Installation Procedures contained in EHB 9-904 were followed. The Instructions were easy to understand and straightforward without any incidents that halted the installation. However, some installation steps need to be updated to clarify the Installation Procedures. At the end of the software installations at WSH and SR&DC, a SIR will be generated for the comments on RRS ST XP Software Installation Procedures. OPS24 is working on the list of corrections and recommendations to be included in the RRS EHB9-904 Software Installation Procedures.

April 15: Ghosting and installation of RWS S/W version 0.0.0.214 were performed on the System 6 and 7 workstations at SR&DC by OPS24 personnel. Both workstations are the new 6300 E Series Gateway machines running Windows XP. Both systems are ready for live flight testing scheduled to begin Monday morning, April 18. For System 7 only, security keys were configured for LDAD on AWIPS NMTW.

April 18: Two live flights were flown following test procedure 403. The first fight was flown to termination as a "hands off" flight (i.e., termination above 70 hPa test) using both systems. The second flight had a minor release time correction (changed by 1 second) made to both systems. System 7 was allowed to go to termination; System 6 was terminated by the Observer (following test procedure direction) between 400 hPa and 70 hPa. The System 6 flight was successfully archived. All System 7 products were transmitted to NCEP and NCDC.

April 19: Two flights were launched and tracked successfully by System 6 (69991) and System 7 (69990). The first flight (13 UTC) terminated at 11.65 hPa (burst) and the second flight (15 UTC) at 10.42 hPa (burst - System 7 only; see below). The System 7 coded messages and NCDC archives were transmitted for both flights.

During the first flight, System 7 was used to test the Plot Overlay capability (Test 402A). When the overlay on the pressure plot was turned off and the Observer exited from the plot; the temperature plot now had large orange circles marking the levels while the RH plot showed large red squares. Printout is available. SIR 2666.

The first flight on System 6 was used to test the Antenna Search Mode capability (Test 403A). When the antenna was placed 75 degrees (in azimuth) off of the radiosonde, the TRS failed to lock on (Auto Track) the radiosonde and was unable to locate the radiosonde using the Search mode. In addition, the Observer experienced difficulty in switching to the Manual mode. SIRs 2667 and 2668.

During the second flight, System 7 was a "hands off" flight which used the drop-down menu to manually detect the release; System 6 used the Simulated Release icon. Both systems detected the release flawlessly. System 6 as then used for the "RWS Termination Below 400 hPa" test by changing the receiver frequency at 499 hPa from

1682 to 1676. System 6 successfully terminated the flight for excessive missing data at 432 hPa.

April 20: Two flights were launched and tracked successfully by System 6 (69991) and System 7 (69990). The first flight (13 UTC) terminated at 9.92 hPa (burst - both systems) and the second flight (18 UTC) at 10.42 hPa (burst - System 7 only; see below). The System 7 coded messages and NCDC archives were transmitted for both flights.

The flights included the multiple releases on the same ascension test and changing the termination level. Editing was performed on System 7 and the flight was allowed to go to burst. System 6 was used for the termination level test which was set to 70 hPa and performed flawlessly.

April 21: Radiosondes was prepared using the new instructions provided by OS7. OPS22 will provide comments to OS7.

One flight was launched and tracked successfully by System 6 (69991) and System 7 (69990). The flight (13 UTC) terminated at 9.83 hPa (burst) for System 7 and at 30 hPa for System 6 to test User Termination. The System 7 coded messages and NCDC archives were transmitted for both flights.

A second flight was not launched due to the weekly TRG meeting at WSH. Instead Rework tests were conducted.

April 22: The first flight (13 UTC) was launched and tracked successfully by System 6 (69991) and System 7 (69990). The flight terminated at 10.94 hPa (burst) for both systems.

For the first flight, there was no GPS/wind data until about 9.5 minutes after release. The suspected reason for this is the radiosonde was carried into the inflation shelter and placed on the inflation table while it was being tied to the balloon. The radiosonde was then carried outside the shelter with the balloon and released almost immediately. The usual procedure (at the SR&DC) is to hang the radiosonde from a baseline pedestal outside the inflation shelter while it's being tied to the balloon. Some field sites (such as those in Alaska) might not have an outdoor baseline pedestal near the inflation shelter; at these sites, the normal procedure may be to bring the radiosonde into the shelter to tie it to the balloon as was tested for this flight.

The second flight (15 UTC) was launched and tracked successfully by both systems. On System 7 the flight terminated at 29.81 hPa (burst). On System 6 the flight was terminated manually by the operator at 381.5 hPa in order to test RWS specifications associated with user termination.

The System 7 coded messages and NCDC archives were transmitted for both flights.

April 25: The first flight (13 UTC) was launched and tracked successfully by System 6 (69991) and System 7 (69990). On System 7 RWS terminated the flight at 10.64hPa (burst). On System 6 the operator manually terminated the flight at 441.3hPa in order to test RWS specifications associated with user-selected terminations.

The second flight (15 UTC) was launched and tracked successfully by both systems. On System 7 RWS terminated the flight at 11.04hPa (burst). On System 6 the operator terminated the flight manually at 85.40hPa by clicking the 'X' button in the top right corner of the display. RWS responded gracefully to this action, and the operator was able to bring the flight into Rework. (NOTE: Exiting in this manner is not a valid method of testing the RWS' ability to recover from an unexpected mid-flight shut-down or failure, but was done to test graceful shutdown. Test 501, Failure and Recovery, will be conducted later.)

The System 7 coded messages and NCDC archives were transmitted for both flights.

April 26: The first flight (13 UTC) was launched and tracked successfully by System 6 (69991) and System 7 (69990). On System 7 RWS terminated the flight at 9.92hPa (burst). On System 6 the operator manually terminated the flight above 400hPa in order to test RWS specs associated with user-selected terminations. The operator terminated the flight by "simulating" a power failure. On restarting RWS, a message was displayed indicating the flight data base was corrupt and was being deleted. System 6 responded as designed to this scenario by asking if another flight was desired using the same ascension number. [Note: The radiosonde used was one salvaged from one of the previous day's flights that had its cardboard casing ripped off during launch because of the high winds (20 knots sustained). It was simply reinserted in a casing from a rejected radiosonde.]

The second flight (16 UTC) was launched and tracked successfully by both systems. Both systems terminated with a burst at 12.2hPa.

The System 7 coded messages and NCDC archives were transmitted for both flights.

April 27: The first flight (13 UTC) was launched and tracked successfully by system 7 (69990). RWS terminated the flight at 10.86hPa (burst). System 6 was used to conduct test procedure 215, Flight Summary Utility. The test was a success.

The second flight (16 UTC) was launched and tracked successfully by both systems. Both systems terminated with a burst at 23.19hPa. At the request of WSH test personnel, System 6 had its time changed to December 31, 2005, 2245 UTC for the flight. The ascension number correctly rolled over to 1 as the "new year" began. RWS software was reinstalled on System 6 after the flight with the correct time and a beginning ascension number of 300.

The System 7 coded messages and NCDC archives were transmitted for both flights.

April 28: OPS11 and OS7 supported the test activities at SR&DC Building 16.

The first flight (12 UTC) was launched and tracked successfully by System 6 (69991) and System 7 (69990). RWS terminated the flight at 7.4hPa on both systems (burst). The flight was used to test the TRS/RWS search functions (test procedure 403-A). The sequence of events was as follows:

a. Both systems: Put TRS into Manual Mode at approximately 24 minutes Elapsed Time (ET).

b. System 6: Moved antenna 75 degrees in azimuth (entered new azimuth and clicked Move Antenna).

c. System 7: Moved antenna 45 degrees in elevation (entered new elevation and clicked Move Antenna).

d. Both systems: After moving antenna, put TRS back into Auto Mode.

e. Both systems: Between 26 and 27 minutes ET, RWS displayed the following pop-up message: "Application has detected conditions which require a limited search." TRS automatically went into Manual Mode -- not Search Mode. (Pop-up message too vague; see SIR #2688)

f. Both systems: Clicked OK in the pop-up and manually put TRS into Search Mode.

g. Both Systems: Between 28 and 29 minutes ET, RWS displayed the following pop-up message: "Attention: going into Full Search Mode." Clicked OK in the pop-up.

h. System 7: Aborted full search before search completed in order to avoid losing flight for excessive missing data; manually put TRS into Manual Mode and re-acquired the radiosonde by moving antenna to the approximate azimuth/elevation from the plotted data and put the TRS into Search Mode.

i. System 6: Observed full search to completion; when full search moved past known radiosonde position, signal strength briefly jumped to about '30'. Full search continued. After the Full Search completed, TRS automatically returned to the Manual Mode with the antenna in the 0/0 position. Re-acquired radiosonde by moving antenna to known position and putting TRS into Search Mode. (Full search failed to re-acquire radiosonde; see SIR #2687)

The second flight (15 UTC) was launched and tracked successfully by both systems. RWS terminated the flight at 7.8hPa (burst) on both systems. This time only System 6 was used to test the TRS/RWS search functions. For step b (above) the antenna was slowly moved about 110 degrees in azimuth using the slewing buttons. This time when the 'limited search' pop-up appeared (step e, above), the TRS automatically went into

Search Mode and promptly re-acquired the radiosonde as designed. (In the TRG meeting, OPS11, OPS24, and OS7 discussed why the first flight did not behave this way.)

The System 7 coded messages and NCDC archives were transmitted for both flights.

April 29: This was the last day of live flight testing for ST XP. OS7 supported the test activities at Building 16 today.

The first flight (12 UTC) was launched and tracked successfully by System 6 (69991) and System 7 (69990). RWS terminated the flight for excessive missing data at 89.5hPa on System 6 and 86.9hPa on System 7. During preflight the System 6 SPS failed to initialize until the baseline process was aborted by the observers and the UPS was cycled off and on. System 7 baselined the same radiosonde without a problem. See SIR 2690.

The second flight (15 UTC) was launched and tracked successfully by both systems. RWS terminated the flight at 9.4hPa (burst) on both systems.

The System 7 coded messages and NCDC archives were transmitted for both flights.

4.4 Summary

This section provides a summary of the test results.

4.4.1 Hardware

With the exception of one failed radiosonde out of the box, the RRS hardware successfully performed during a total of 20 live flights conducted during the ST XP Test. It is unknown if the problem (SIR 2687) experienced with the TRS failure to locate a radiosonde during a search was due to software or hardware. OPS11 and OPS23 are investigating the issue.

4.4.2 Live Flights

Attachment 2 contains the flight summaries for Systems 6 and 7. Products to NCEP and NCDC were only transmitted from System 7. The RWS properly reported all flight terminations consistent with the WMO data and the Observer's opinion and experience.

All RWS products were analyzed for accuracy and usability by OPS22, OS7, NCEP, and NCDC personnel.

4.4.3 New SIR List

During the ST XP, a total of 43 SIRs were identified in the following Impact categories:

Impact 1:	6	Prevents a successful observation
Impact 2:	16	Prevents a successful observation; reasonable work around

Impact 3:	11	Less critical degradation of data
Impact 4:	6	Degradation of system capabilities; no data affected
Impact 5:	3	Minimal to no impact; nice to have

Attachment 3 contains a list of all SIRs observed during the ST XP Test complete with the adjudicated RRS CCB status as of May 13, 2005. A listing of all tests conducted at both WSH and SR&DC are contained in Attachment 4.

4.4.4 ST XP Wrap-up TRG Meeting

On May 5, 2005, OPS24 hosted a meeting to discuss the RRS ST XP test which ended on April 29, 2005. The following are some of the more pertinent comments:

a. The meeting began with the RRS Program Manager, Dom Bosco (OPS11), thanking personnel from OPS22, OS7, the NCEP, the NCDC, the NWS Telecommunications Gateway (NWSTG), Northrop Grumman Information Technology (NGIT), and the Baltimore, MD/Washington, DC Weather Forecast Office (WFO-LWX) for "stepping up" to test and support the unanticipated ST XP. He further indicated the hectic pace will most likely continue in the foreseeable future until after the RRS Operational Acceptance Test (OAT).

b. At the TRG, OPS24 commented it was risky to proceed to the ST II at Caribou, ME with known Impact 1 and 2 SIRs. The Program Manager, Dom Bosco (OPS11) decided to proceed to the ST II as scheduled on May 16, 2005, to test RRS in an environment much closer to an operational site than the SR&DC.

c. Eddie Roberts (OPS23) reported several of the Impact 1 and 2 SIRs found during the ST XP would not be implemented in time to be part of the RWS build used at Caribou, but would be ready for the OAT. Since the RWS software used at Caribou was supposed to be used during OAT, Jae Lee (OPS24) expressed concern there would be a risk as it would be untested. Dom replied the RWS software initially delivered to Caribou, would be upgraded during ST II as part of the test and that would be the build delivered to the OAT sites.

d. John Monte (OPS11) reported the System 6 RWS had been removed from Building 16 and delivered to the WFO-LWX for training. To troubleshoot SIR 2690, the SPS would be removed from the System 6 radome and installed in RRS System 7 radome.

e. Larry Griffin (NCDC) indicated the zipped archive files were received without any problems using the "drag and drop" method from the RWS. Both he and Bill Blackmore (OPS22) stated the data were a little more jittery than MicroArt, but believed it was due to the use of one second data (from the RRS) rather than six second data (from the MicroArt).

The RRS Program Manager, Dom Bosco (OPS11), declared the RRS ST XP completed and the ST II at the Weather Forecast Office in Caribou, ME ready to begin on May 16, 2005.

5.0 Conclusions

The objectives for the ST XP were evaluated as follows:

1. Assess the impact of changing the RWS computer and operating system by re-validating the RWS SRS.

During the ST XP test period (April 14-29), OPS24 conducted 58 tests at WSH and 25 tests and 20 live flights at the SR&DC. The live flight logs for Systems 6 and 7 are contained in Attachment 2. The products from System 7 for each of the 20 flights were transmitted to the NCEP and the archive data was FTPed to the NCDC.

The 83 tests were used to evaluate the new computer and operating system against the RRS System Requirement Specification (SRS). Of the 398 RWS requirements, 339 were re-verified by the 83 tests conducted. Of the 59 remaining requirements, 55 were not part of the ST XP since they were procedural requirements and were computer/operating system independent; three requirements (4.4.1, 6.7.1.3.3.2, and 6.7.2.16.2) only pertain to future Intermet radiosondes (Sippican radiosondes were used during the test); and one requirement failed (5.1.3.11 – SIRs 2667 and 2668).

During the ST XP, there were problems with Windows menu "Send to ZIP" option and the Print Screen capability "disappearing." The missing menu option would reappear after the RWS "Emergency" folder was closed and reopened several times. [Note: The "Send to Zip" option is used to prepare the archive files for transmission to the NCDC.] To restore the Print Screen capability, it was necessary to reload the Hewlett Packard Print Screen application. The missing menu items occurred on both RRS Systems 6 and 7; the missing Print Screen capability only occurred on System 6.

2. Verify the RWS installation instructions contained in Engineering Handbook (EHB) 9-904 were accurate and complete. (Performed by OPS24).

EHB 9-904 instructions were used by OPS24 to install the RWS software Build 214 on the two RWS Systems "blue" and "yellow" at WSH and RWS Systems 6 and 7 at the SR&DC. Recommendations were noted and provided to OPS23/OPS12 for inclusion.

3. Determine the stability of the RWS software for deployment to operational sites. (Performed by OS7 and OPS22).

During the ST XP, a total of 43 SIRs were written. After adjudication by the RRS TRG and the RRS CCB, 34 SIRs remained open (26), deferred (5), or in a Watch State (3). Of those 34 SIRs, 17 (50%) were Impact 1 or 2 SIRs which "prevented a successful

observation." Attachment 3 contains a list of all SIRs written. (Note: The list contains 42 SIRs—one SIR was merged with another and, once merged, it is not possible to list the individual SIR in the Test Track database.)

6.0 Recommendations

Before proceeding to the next phase of testing, the following recommendations are made:

a. OPS23 to correct and validate all Impact 1 and 2 SIRs.

b. OPS12 update all technical documentation.

c. OS7 update all user documentation.

Attachment 1 - RRS RE-CERTIFICATION RECORDED INFORMATION

System 6*

Telemetry Receiver System		
	TRS Pedestal Model	IMS-2000
	TRS Pedestal Serial NO.	006
	TRS Pedestal DOC Barcode	CD 0001456176
	SCA Serial Number	44330632
	DCE Serial Number	17603999 (assumed)
	SPS Serial Number	005206
	DC Power Supply S/N	513
	UPS Serial Number	AS0126110375
	Local CDU Serial Number	44330548
	Remote CDU Serial Number	44330645
RRS Work Station (RWS)		
	Computer Serial Number	0029662482
	Printer Serial Number	MY29P1P3GK
	External Hard Drive S/N	13024447
	DCE Serial Number	Unknown
Precision Digital Barometer (PDB)		
	PDB Serial Number	None
TRS Firmware Versions		
	SCA	1.29
	MCU	1.40
	Receiver	2.09
	Scanner	2.00q
	Local CDU	3.27
	Remote CDU	3.27
	SPS	2.10

* Note: Only System 7 was actually recertified at OPS24's request; however, System 6 information is provided for completeness. Originally, OPS24 specified in the ST XP Test Strategy dated March 17, 2005, both system would be certified with System 7 using the Windows XP operating system and System 6 using the original Windows 2000 operating system for comparison purposes. However, once OPS23 began work on the operating system migration, there was no further updates to the Windows 2000 RWS software. A decision was made by the ST Director to load Windows XP on both systems in order to obtain additional test data points.

System 7

Telemetry Receiver System		
	TRS Pedestal Model	IMS-2000
	TRS Pedestal Serial NO.	007
	TRS Pedestal DOC Barcode	CD 0001456177
	SCA Serial Number	44330544
	DCE Serial Number	17603993
	SPS Serial Number	531 RP1004
	DC Power Supply S/N	514
	UPS Serial Number	AS012611087
	Local CDU Serial Number	44330566
	Remote CDU Serial Number	44330549
RRS Work Station (RWS)		
	Computer Serial Number	0034601907
	Printer Serial Number	5G42J110SK
	External Hard Drive S/N	150802273
	DCE Serial Number	AOZ030310076
Precision Digital Barometer (PDB)		
	PDB Serial Number	154
TRS Firmware Versions		
	SCA	1.29
	MCU	1.40
	Receiver	2.09
	Scanner	2.00q
	Local CDU	3.27
	Remote CDU	3.27
	SPS	2.10

Attachment 2 – ST XP Flight Summary Form

System #6: 69991

Date	RWS Flt #	Release Hour (UTC)	Term hPa	Term Reason	Comments
4/18/05	100	13	9.12	Burst	
4/18/05	101	15	282.77	Observer Terminated	Test 403, scenario # 10
4/19/05	102	13	11.65	Burst	
4/19/05	103	15	556.46	RWS Term – Excessive Missing Data	Test 403 scenario # 8
4/20/05	104	13	9.83	Burst	Test 403 scenario # 13; 3rd release
4/20/05	105	18	70	Observer Terminated	Test 403 scenario # 10
4/21/05	106	13	29.97	Observer Terminated	Test 403 scenario # 9
4/22/05	107	13	10.94	Burst	
4/22/05	108	15	381.45	Observer Terminated	Test 403 scenario # 10
4/25/05	109	13	441.3	Observer Terminated	Test 403 scenario # 11
4/25/05	110	15	85.40	Observer Terminated	Test 403 scenario # 10
4/26/05	111	13	?	Unknown	Test 501 (Failure and Recovery) - No data as flight was deleted from database by RWS

Date	RWS Flt #	Release Hour (UTC)	Term hPa	Term Reason	Comments
4/26/05	112	16	12.20	Burst	SIRs 2682, 2683, 2684
4/27/05				NA	Used for Test 215
4/27/05	001	“00”	22.98	Burst	Special test – set date/time to 12/31/05 2345 UTC for roll over test; sw reloaded and ascension set to 300
4/28/05	300	12	7.40	Burst	Special rerun of test 403A
4/28/05	301	15	7.85	Burst	
4/29/05	302	12	89.49	Excessive Missing Data	
4/29/05				Burst	

System #7: 69990
ST XP Test

Date	RWS Flt #	Release Hour (UTC)	Term hPa	Term Reason	Comments
4/18/05	100	13	9.12	Burst	
4/18/05	101	15	34.85	Burst	SIR 2660
4/19/05	102	13	11.65	Burst	
4/19/05	103	15	10.42	Burst	
4/20/05	105	13	9.83	Burst	System crashed during 104 causing another number in order to complete multiple releases on the same ascension
4/20/05	107	18	17.59	Burst	
4/21/05	108	13	9.64	Burst	
4/22/05	109	13	10.94	Burst	Changed Release Time; no GPS winds until about 9.30 Elapsed Time.
4/22/05	110	15	29.81	Burst	
4/25/05	111	13	10.64	Burst	
4/25/05	112	15	11.04	Burst	SIR 2680
4/26/05	113	13	9.92	Burst	

Date	RWS Flt #	Release Hour (UTC)	Term hPa	Term Reason	Comments
4/26/05	114	16	12.20	Burst	
4/27/05	115	13	10.86	Burst	
4/27/05	116	16	23.19	Burst	
4/28/05	117	12	7.40	Burst	
4/28/05	118	15	7.81	Burst	Five freezing levels; GPS dropouts late in the flight—did not show in received PDS
4/29/05	119	12	86.89	Excessive Missing Data	
4/29/05	120	15	9.40	Burst	

Attachment 3 - SIRs Found During ST XP

(Note: This list contains all SIRs written during the test period and reflects the adjudicated status as of May 20, 2005)

Number	Summary	Impact	Priority	Date Entered	Status
2654	In very rare cases, RWS may hang at TERM when user's PDS edit operation coincides with start of flight TERM	3 - Less critical degradation of data	2 - Include in next maintenance release	04/14/05	Watch, not assigned
2655	Unable to change termination time to original value	3 - Less critical degradation of data	3 - Include in a future maintenance release	04/14/05	Design, assigned to Chase, Greg
2656	Error - Failed to complete installation	3 - Less critical degradation of data	2 - Include in next maintenance release	04/15/05	Watch, not assigned
2657	RWS installation did not import all flights from backup	2 - Prevents successful observation; reasonable workaround	2 - Include in next maintenance release	04/15/05	Closed
2658	OMS Startup.exe is in a ZIP file	4 - Degradation of system capabilities; no data affect	5 - Undetermined	04/15/05	NWS Validation Review, assigned to Roberts, Edward
2659	When Adding a User, Entered Comments are Erased	4 - Degradation of system capabilities; no data affect	5 - Undetermined	04/15/05	Approved, assigned to Reddy, Jakku
2660	TRS Does Not Go to Manual Track Mode on Exiting From RWS	2 - Prevents successful observation; reasonable workaround	2 - Include in next maintenance release	04/18/05	NWS Validation Review, assigned to Roberts, Edward
2661	Observer Can Run OMS/OBIT Applications	3 - Less critical degradation of data	2 - Include in next maintenance release	04/18/05	Closed
2662	When Observer Runs OMS/OBIT Log Files are not Created	5 - Minimal to no impact; nice to have	2 - Include in next maintenance release	04/18/05	Approved, assigned to Cochran, Sam
2663	Canceling the Saving a Calibration File Generates an Error Message	4 - Degradation of system capabilities; no data affect	2 - Include in next maintenance release	04/18/05	Deferred, not assigned
2664	Missing Winds Data Display	3 - Less critical degradation of data	5 - Undetermined	04/19/05	Closed
2665	Rapid RH changes	3 - Less critical degradation of data	5 - Undetermined	04/19/05	Closed
2666	Plot Overlay Problem	4 - Degradation of system capabilities; no data affect	2 - Include in next maintenance release	04/19/05	Deferred, not assigned
2667	Unable to locate radiosonde using Auto or Search	2 - Prevents successful	2 - Include in next	04/19/05	Analysis, assigned to Modracek,

	tracking mode	observation; reasonable workaround	maintenance release		Darryl
2668	Difficulty Switching from Auto to Manual Track Modes	2 - Prevents successful observation; reasonable workaround	2 - Include in next maintenance release	04/19/05	Analysis, assigned to Modracek, Darryl
2669	Pressure discrepancy during baseline	2 - Prevents successful observation; reasonable workaround	2 - Include in next maintenance release	04/20/05	Analysis, assigned to Navarro, Ivan
2670	Doing a Second Release Does Not Close the Configuration Window	4 - Degradation of system capabilities; no data affect	2 - Include in next maintenance release	04/20/05	NWS Validation Review, assigned to Roberts, Edward
2671	Closing the Configuration Window Crashes the System	1 - Prevents successful observation; no workaround	2 - Include in next maintenance release	04/20/05	NWS Validation Review, assigned to Roberts, Edward
2672	Local Area Network Connection Disappeared	2 - Prevents successful observation; reasonable workaround	3 - Include in a future maintenance release	04/20/05	Implementation, assigned to Roberts, Edward
2673	Changing the PDS Configuration Time Affects Multiple Functions	3 - Less critical degradation of data	2 - Include in next maintenance release	04/20/05	Watch, not assigned
2674	Duplicate Received PTU Data Levels on Both Systems	3 - Less critical degradation of data	2 - Include in next maintenance release	04/20/05	Watch, not assigned
2675	WMO Coded and RADAT Message window on System 6 was not displayed	2 - Prevents successful observation; reasonable workaround	2 - Include in next maintenance release	04/20/05	Design Review, assigned to Roberts, Edward; Castro, Claudina
2676	"Missing Mandatory Pressure Level" Check Message Was Not Displayed	3 - Less critical degradation of data	5 - Undetermined	04/20/05	Deferred, not assigned
2677	"No Data Message" Caused Unknown Exception Error	2 - Prevents successful observation; reasonable workaround	2 - Include in next maintenance release	04/20/05	NWS Validation Review, assigned to Roberts, Edward
2678	RWS crashed during NCDC archive	2 - Prevents successful observation; reasonable workaround	2 - Include in next maintenance release	04/21/05	NWS Validation Review, assigned to Roberts, Edward
2679	EHB9-904 comments	4 - Degradation of system capabilities; no data affect	2 - Include in next maintenance release	04/25/05	Approved, assigned to Clark, Ken; Uhlman, John
2680	Raw data missing from temperature plot	3 - Less critical degradation of data	5 - Undetermined	04/25/05	Deferred, not assigned
2681	Error Message: " Failed to update balloon release time. Refer to DEBUG log file " Was Displayed	2 - Prevents successful observation; reasonable workaround	5 - Undetermined	04/25/05	NWS Validation Review, assigned to Roberts, Edward

2682	RWS Did Not Ask For Previous Temperature	2 - Prevents successful observation; reasonable workaround	2 - Include in next maintenance release	04/26/05	Closed
2683	Incorrect coding of max winds and sig winds	1 - Prevents successful observation; no workaround	2 - Include in next maintenance release	04/26/05	NWS Validation, assigned to Roberts, Edward
2684	Three Trops Selected	2 - Prevents successful observation; reasonable workaround	2 - Include in next maintenance release	04/26/05	Closed
2685	Bad Radiosonde Out of the Box	2 - Prevents successful observation; reasonable workaround	2 - Include in next maintenance release	04/26/05	Approved, assigned to Navarro, Ivan
2686	New Feature --- Tool to provide additional information about importing flights during installation	5 - Minimal to no impact; nice to have	5 - Undetermined	04/27/05	Approved, assigned to Castro, Claudina
2687	TRS Full Search failed to acquire radiosonde	2 - Prevents successful observation; reasonable workaround	2 - Include in next maintenance release	04/28/05	Submit, assigned to Modracek, Darryl
2688	Limited Search should have been started & Pop-up message for limited search too vague	3 - Less critical degradation of data	2 - Include in next maintenance release	04/28/05	NWS Validation Review, assigned to Roberts, Edward
2689	Required Check Messages Were Not Displayed	3 - Less critical degradation of data	4 - Include in next major build	04/28/05	Deferred, not assigned
2690	System 6 SPS non-critical equipment failure	2 - Prevents successful observation; reasonable workaround	2 - Include in next maintenance release	04/29/05	Approved, assigned to Navarro, Ivan
2691	Missing Wind Group (/////) coded with wrong height	1 - Prevents successful observation; no workaround	2 - Include in next maintenance release	04/29/05	Design, assigned to Karumanchi, Goutham
2692	No max wind coded	1 - Prevents successful observation; no workaround	2 - Include in next maintenance release	04/29/05	Closed
2693	Stability Index and mean winds missing in TTAA message	3 - Less critical degradation of data	3 - Include in a future maintenance release	04/29/05	Design, assigned to Moren, Chris; Reddy, Jakku
2694	Questionable Showalter Index	1 - Prevents successful observation; no workaround	2 - Include in next maintenance release	04/29/05	Closed
2695	Questionable RADAT heights	1 - Prevents successful observation; no workaround	2 - Include in next maintenance release	04/29/05	Closed

Attachment 4 – Tests Performed During the ST XP

NWSHQ
RRS ST XP Checklist
April 14 – April 29, 2005

#	Test No	Title	User	Data Set	Estimated Time Required	Initials	Test Date
000 Series - Installation							
1	001	RRS Installation	A	N/A	6.0	HT	4/15/05
200 Series - System Administration							
2	211	NCDC Archive Utility	O/A			HT	4/15/05
3	212	Flight Management – Flight Import and Export Utility	O/A	NA	1.0	HT	4/18/05
4	214	Flight Management - Flight Deletion Utility	A	N/A	1.0	HT	4/18/05
5	220	Application Utility(delete for next ST)	A	N/A	2.0	HT	4/18/05
6	221	Application - Plots Utility	A	N/A	2.0	HT	4/18/05
7	231	Administration - User Administrative Utility	A	N/A	2.0	HT	4/19/05
8	235	Administration - File Location Utility (delete for the next ST)	A	N/A	1.0	HT	4/19/05
9	236	Administration - Preflight Information Utility (delete for next ST)	A	N/A	1.0	HT	4/19/05
400 Series -Evaluation of RWS Functional Capabilities							
10	400	GUI Checkout	O	N/A	5.0	HT	4/20/05

#	Test No	Title	User	Data Set	Estimated Time Required	Initials	Test Date
11	401	Nominal Inline Simulator Flight	T	N/A	2.0	HT	4/20/05
12	401a	Editing Check Messages	O	N/A	2	HT	4/21/05
13	402	Nominal Flight - XDP	O	N/A	2.5	HT	4/21/05
14	405a	Synoptic vs Special Designation Case#1	A/O	N/A	6.0	HT	4/22/05
15	405b	Synoptic vs Special Designation Case#2	A/O	N/A	5.0	HT	4/22/05
16	405c	Synoptic vs Special Designation Case#3	A/O	N/A	5.0	HT	4/25/05 (SIR)
410 Series - Data Quality and Check Messages							
17	410a	Check Messages for SRS 5.1.2.6.1, 6.7.2.9.1, and 6.7.2.9.2 (Test#410 CD)	A	1133.mal 69102-3-1083	2.0	HT	4/21/05
18	410b	Missing Mandatory Pressure Level and Temperature Lapse Rate	O	RRS-999.mal	2.0	HT	4/18/05 (SIR)
19	410c	Data Missing Near Possible Tropopause and Same Pressure At Times. (Test#410 CD).	A	69102-3-1071	2.0	HT	4/28/05
20	410d	No Tropopause Found At 500mb Or Above and No Level Within 20mb of the Surface	O	5007.mal	2.0	HT	4/28/05

#	Test No	Title	User	Data Set	Estimated Time Required	Initials	Test Date
21	410e	Wind Speed and Direction Changes, and Superdiabatic Lapse Rate detected. (Test#410 CD)	A	69102-3-1082	2.0	HT	4/19/05
22	410f	Wind Speed Exceeds 180kts	O	1039.mal	2.0	HT	4/19/05
23	410g	Balloon Descended and Reascended Detected	O	proclc.mal	2.0	BV	4/22/05
24	410h	Temperature Lapse Rates	O	2249.mal	2.0	HT	4/28/05
430 Series - RRS Anomalous Flight Situations							
25	430a	Missing Winds data	O	1004.mal	1.0	BV	4/18/05 (SIR)
26	430b	Excessive Missing data	O	1122.mal	1.0	BV	4/20/05
27	430c	Maximum Winds 132kts data	O	1006.mal	1.5	BV	4/20/05
28	430d	Maximum Winds 247kts data	O	1039.mal	1.5	BV	4/21/05
29	430e	Rapid RH changes	O	1118.mal	1.5	BV	4/18/05
30	430f	Temperature less than -80C Degree	O	1095.mal	2.0	BV	4/21/05
31	430g	Less Than 250 m/min Ascension Rate	O	1096.mal	2.0	BV	4/19/05
32	430h	Floating Balloon	O	1137.mal	2.0	BV	4/22/05
33	430i	Constant Pressure at 200 hPa	O	4001.mal	2.0	BV	4/15/05
34	430j	Constant Pressure at 600 hPa	O	4004.mal	1.0	BV	4/19/05
35	430k	Excessive Missing Pressure Data	O	1148.mal	2.0	BV	4/15/05
36	430l	Balloon Burst	O	SIR2054.mal	2.0	BV	4/22/05
37	430m	Temperature Inversion Off Surface	O	1613.mal	2.0	BV	4/19/05

#	Test No	Title	User	Data Set	Estimated Time Required	Initials	Test Date
38	430n	Multiple Super Adiabatic Lapse Rates	O	2183.mal	2.0	BV	4/15/05
39	430o	Failed Temperature Sensor	O	5001.mal	2.0	BV	4/18/05
40	430p	Out of Range Temperature Spikes	O	5004.mal	2.0	BV	4/20/05
41	430q	Within Range Temperature and Pressure Spikes	O	AllSpikes.mal	2.0	BV	4/21/05
42	430r	Seven Freezing Levels	O	1655.mal	2.0	BV	4/15/05
43	430s	Negative Pressure Levels	O	4005.mal	1.0	BV	4/18/05
44	430t	Out of Range Pressure Spikes	O	4006.mal	2.0	BV	4/20/05
440 series - RRS Extreme Site Locations							
45	440a	Key West (KHQR), FL	A	1240m.s03	2.0	HT	4/20/05
46	440b	Riverton (KHQV), WY	A	1239m.s03	2.0	HT	4/21/05
47	440c	Flagstaff (KHQP), AZ	A	1181m.s03	2.0	HT	4/22/05
48	440d	Kodiak (KHQS), AK	A	1178m.s03	2.0	BV	4/25/05
49	440e	Hilo (KHQQ), HI	A	1237m.s03	2.0	BV	4/25/05
50	440f	Pago Pago (KHQT)	A	1226m.s03	2.0	BV	4/25/05
51	440g	Yap, WCI (KHQV)	A	1241m.s03	2.0	BV	4/26/05
52	440h	Barrow (KHQN), AK	A	1182m.s03	2.0	BV	4/26/05
Test Requires MS Access Program							
53	450	Surface Data 10 Minutes	N/A	N/A	2.0	BV	4/27/05
500 Series – Flight Processing and “after Termination” Processing							
54	502	Disk Storage Warning	A	N/A	1.0	BV	4/27/05

#	Test No	Title	User	Data Set	Estimated Time Required	Initials	Test Date
Tests Require Time Changed							
55	402b	Comparison Flight Test	O	N/A	2.0	HT	4/26/05
56	410i	Temperature and Height Changes	O	1089.mal 1197.mal	2.0	HT	4/27/05
700 Series - Messages Checklist							
57	703	Status Messages Checklist	O	N/A	2.0	HT	5/02/05
58	706	Pop-Up Messages Checklist	O	N/A	2.0	HT	5/02/05

**NOTE:

A: administrator O: observer T: trainee

SR&DC Test Checklist
RRS System Test XP
April 14 – April 29, 2005

Test #	TP#	Test Title/Scenario	User Acct	Init	Date
		Installation and Hardware			
1	001	RRS Installation	A	SLC	4/15/05
2	002	TRS/CDU Remote Operations	A	SLC	4/18/05
3	003	SPS Communication Status	A	SLC	4/18/05
4	004	Offline Utility Suite validation	A	SLC	Varied
5	501	System Failure/Recovery	O #6	SLC	4/26/05
		Live Flight * See Additional Live Flight Tests section for more Live Flight tests *** NOTE: Live flight tests will use NAVMAN radiosondes unless otherwise noted in Comments.**			
6	403	RWS Termination Above 70hPa	O #6/7	SLC	4/18/05
7	403	RWS Term Above 400/Below 70hPA	O #6	SLC	4/20/05
8	403	RWS Term Below 400hPa	O #6	SLC	4/19/05
9	403	User Term Above 70hPa	O #7	BB	4/21/05
10	403	User Term Above 400/Below 70hPa	O #6	BB SLC	4/22/05 4/18/05
11	403	User Term Below 400hPa	O #6	KB	4/25/05
12	403	Manual Release Detection	O #6/7	SLC	4/19/05
13	403	Multiple releases on same ascension	O #6/7	SLC	4/20/05
14	403A	Antenna Search Mode Test	O #6	SLC KB	4/19/05 4/29/05
		Flight Rework			
15	413	AWIPS Transmit	O #7	BB	4/25/05

Test #	TP#	Test Title/Scenario	User Acct	Init	Date
16	404	- Station Data Option 1 - Within 6 hours of selected flight	O #7	BB/JL	4/21/05
17	404	- Station Data Option 1 - Not within 6 hours of selected flight	O #7	BB/JL	4/21/05
18	404	- Station Data Option 2 - Within 6 hours of selected flight	O #7	BB/JL	4/21/05
19	404	- Station Data Option 2 - Not within 6 hours of selected flight	O #7	BB/JL	4/21/05
Flight Management and Administration					
20	211	Flight Archive	A #7	KB	4/25/05
21	215	Flight Summary	O/A #6	SLC	4/27/05
22	233	Master Station Data	A #7	KB	5/02/05
23	234	Database Backup and Restore	*	NA	NA
24	402A	Plots - Overlay	O #7	SLC	4/19/05
Miscellaneous Tests (annotated as needed)					
Additional Live Flight Tests (annotated as needed)					
25	402	End of Year Ascension Roll Over	O/A #6	SLC	4/27/05